

# Is a reading addition necessary for clinical contrast sensitivity measurements?

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**Purpose:** Clinical tests of contrast sensitivity (CS) are performed at near with letters large enough to be above the acuity threshold of presbyopes with normal vision. Is a reading addition necessary to obtain accurate thresholds?

**Methods:** Pelli-Robson<sup>1</sup> and Mars<sup>2</sup> chart contrast sensitivity was assessed under 2 conditions:

- Wearing habitual distance refractive correction
  - Additionally wearing an appropriate addition for the working distance (+0.75DS for the Pelli-Robson at 1m; +2.00DS for the Mars at 50cm).
- Participants (Table 1) had normal or corrected-to-normal distance acuity, and were:
- Presbyopes, assessed binocularly.
  - Pre-presbyopes with cycloplegia induced using 1 drop of 1% cyclopentolate, assessed monocularly with a 4 mm pinhole.



**Results:** Repeated measures ANOVA shows:

- No significant effect of participant group ( $F(1,27) 1.76, p=.20$ )
- **Significant impact of chart type ( $F(1,27) 224, p=.000$ ).** Fig 1 shows that Pelli-Robson scores are higher than Mars scores.
- No interaction between participant group and chart ( $F(1,27) 0.09, p=.77$ ).
- No overall effect of addition on scores ( $F(1,27) 1.14, p=.29$ ), and no effect of addition dependent on participant group ( $F(1,27) 1.95, p=.17$ ).
- **Significant interaction between chart and addition ( $F(1,27) 8.91, p=.006$ ), indicating that the effect of the addition was different for each chart.**
- A non-significant interaction between chart, addition, and participant group ( $F(1,27) 0.19, p=.67$ ).

Table 1	Presbyopes (n=16)	Pre-presbyopes (n=13)
Age	67.4±10.0 yrs	20.5±1.4 yrs
Gender	7 male, 9 female	5 male, 8 female
Habitual DVA	-0.05±0.18 logMAR	-0.26±0.09 logMAR

Paired t-tests show that the effect of reading addition:

- Was insignificant for addition of a +0.75D lens with the Pelli-Robson (mean difference 0.02 logCS;  $t(28) 0.79, p=.44$ ).
- Significantly improved Mars scores with addition of a +2.00D lens (mean difference -0.06 logCS or 1.5 letters;  $t(28) -2.65, p=.01$ ).

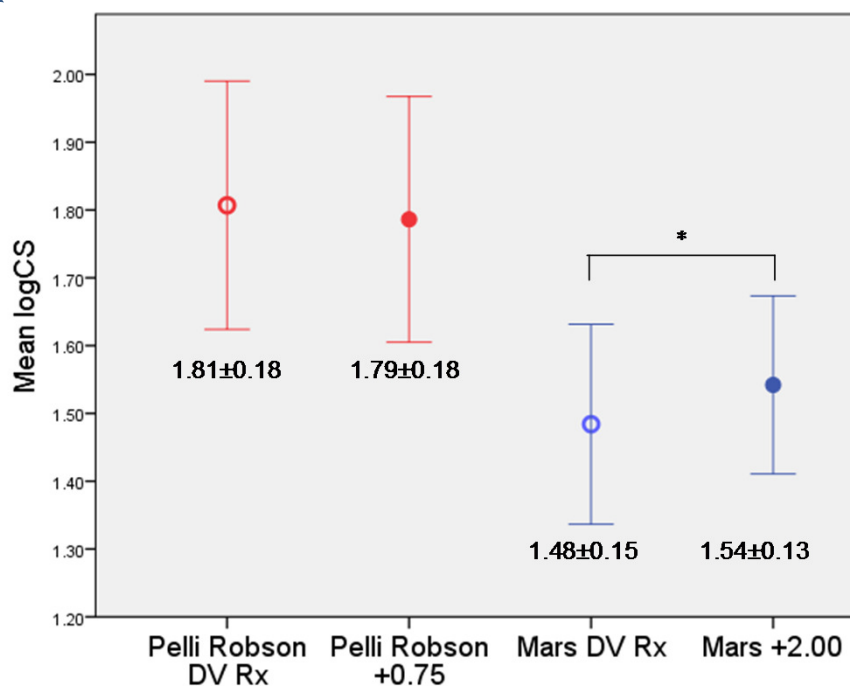
The t-tests had a power of 0.88 to detect a moderately large effect size (Cohen's d) of 0.6 at  $p<.05$ .

## Conclusions:

For presbyopic visual normals:

- Pelli Robson CS can be assessed with patients wearing distance correction: the recommended +0.75D add does not significantly influence thresholds.
- A +2.00D reading add is recommended for use with the Mars chart.

The effect of add on the thresholds of visually impaired subjects or those with reduced CS has not been assessed.



## References:

1. Pelli DG, Robson JG, Wilkins AJ. The design of a new letter chart for measuring contrast sensitivity. Clin Vis Sci, 2: 187-199; 1988.
2. Arditi A. Improving the Design of the Letter Contrast Sensitivity Test. Inv Ophthalmol Vis Sci, 46:2225-2229, 2005.